Small Business Innovation Research/Small Business Tech Transfer

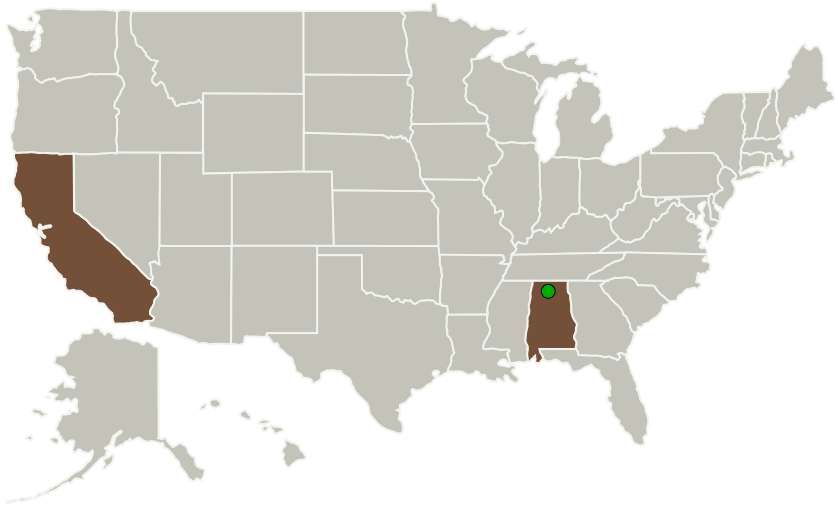
In-Situ Sensing of Additive Manufacturing Process for safety-Critical Aerospace Applications, Phase I

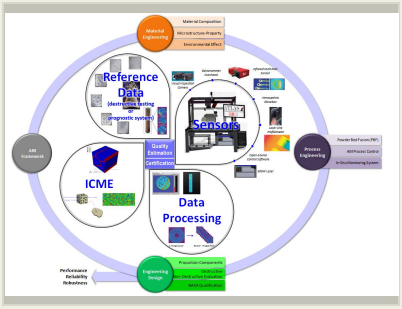
Completed Technology Project (2017 - 2017)

Project Introduction

Certification of fabricated components is an important subject in AM research. Adequate quality inspection of finished parts is challenging and non-destructive-techniques are often difficult to realize. The development of an online in-situ sensing is vital for component qualification and certification. The proposed project will support the goals of ICME through the development of an in situ monitoring system for AM. The system will enable the operator to monitor quality of an AM job online and assess quality of the finished part. The system consists of two major developments in hardware and software. The first development is the design of a complete sensor setup. Sensors ensure a high-quality measurement of melt pool and as-spread/as-processed layer surfaces. Open-source control software will transfer sensing-data at high sample rates sufficient for process monitoring. The second development is the data analysis system to translate and visualize measured sensor values in the format of interpretable process quality images. The visualization is accomplished by a mapping algorithm, which transfers measurements from a time-domain into a position-domain representation. The processed data will feed into ICME tool to predict the void formation, residual stress, damage, oxidation, and other anomalies.

Primary U.S. Work Locations and Key Partners





In-Situ Sensing of Additive Manufacturing Process for safety-Critical Aerospace Applications, Phase I Briefing Chart Image

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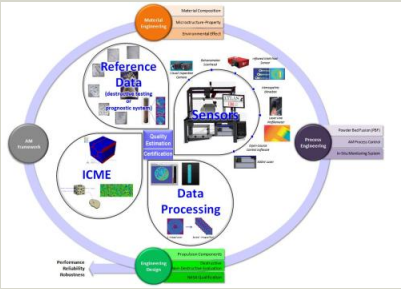
Organizations Performing Work	Role	Type	Location
Alpha STAR Corp	Lead Organization	Industry Women-Owned Small Business (WOSB)	Long Beach, California
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	California

Images



Briefing Chart Image
In-Situ Sensing of Additive Manufacturing Process for safety-Critical Aerospace Applications, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/127867)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Alpha STAR Corp

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

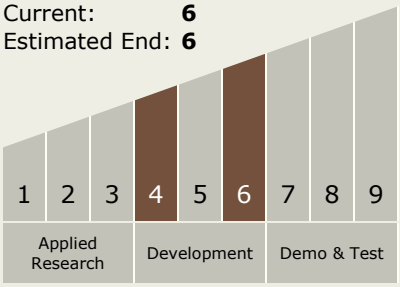
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Frank Abdi

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.2 Structures
    - TX12.2.2 Design and Certification Methods

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System